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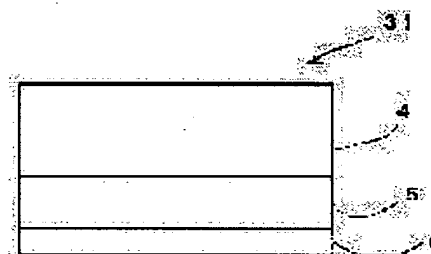
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## (54) LAMP REFLECTOR

## (57)Abstract:

PURPOSE: To increase the luminance of a surface light source device by constituting the device with a resin without using a metal conductive body.

CONSTITUTION: A lamp reflector 31 mounted at the light source of a surface light source device is provided with a white plastic film 4, a white resin coating layer 5 containing a white pigment and a black resin coating layer 6 containing a black dye pigment. The lamp reflector is mounted so that the surface on which the black resin layer is not laminated is in contact with the light source. As a result, the turning-on defect of the light source is prevented and the reflection is enhanced by increasing the hiding property of light from the light source. And flexibility is excellent and working efficiency is also improved.



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**DETAILED DESCRIPTION**

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**[Detailed Description of the Invention]****[0001]**

**[Industrial Application]** Especially this invention relates to the reflector of the field-like light equipment which can use the light from the light source efficiently about the lamp reflector of the light source of field-like light equipment.

**[0002]**

**[Description of the Prior Art]** From the former, field-like light equipment is used as back lights, such as various display, such as a liquid crystal display, and an electric-spectaculars signboard. Field-like light equipment is equipped with the light sources, such as tubular lamps, such as a hot cathode tube and a cold cathode tube, and the light guide plate for carrying out incidence of the light from the light source, making light emit in the shape of a field, and irradiating a display, a signboard, etc. from the whole rear-face surface. It is required that such field-like light equipment should obtain high brightness. Therefore, in order to carry out incidence of the light from the light source to a light guide plate efficiently, a reflector is arranged to the light guide plate and opposition of the light source, and the light diffused in addition to the direction of a light guide plate from the light source is reflected. As a reflector, an aluminum board, a silver vacuum evaporation film, or a foaming white film that is indicated by JP,3-256090,A is used. In order to obtain brightness high as the field-like light source especially, since a reflection factor and the obliterating power are high, the silver vacuum evaporation film which carries out incidence of the light of the light source to a light guide plate efficiently is used abundantly.

**[0003]**

**[Problem(s) to be Solved by the Invention]** However, since the silver which is a conductor approached tubular lamps, such as a hot cathode tube of the light source, and a cold cathode tube, when a silver vacuum evaporation film is used as a reflector, there was a fault of the light source having oscillated or causing poor lighting. Moreover, in order to use a reflector, twisting around the circumference of the light source, flexibility and flexibility were required for the film, and about 75 micrometers of the thickness of a film were a limitation as it was indicated by JP,3-256090,A, when using a foaming white film for a reflector. Although poor lighting of the light source could be prevented when the thin foaming white film of such thickness was used for a reflector, there was a fault that concealment nature will leak the light of the light source outside bad. Moreover, for the low reason, a reflection factor could not carry out incidence of the light of the light source to a light guide plate efficiently, but the fault that the brightness as the field-like light source will become low also had it.

**[0004]** It aims at offering the lamp reflector which this invention is made in order to cancel the above-mentioned fault, and cannot produce poor lighting of the light source, and can be made to be able to carry out incidence of the light of the light source to a light guide plate efficiently, therefore can be used as the field-like light source with high brightness.

**[0005]**

**[Means for Solving the Problem]** In order to attain the above-mentioned purpose, the lamp reflector of this invention is a lamp reflector of the light source of field-like light equipment, and prepares the white

resin layer containing white pigments in one [ at least ] field of white plastic film. Moreover, it is the lamp reflector of the light source of field-like light equipment, and the white resin layer containing white pigments may be prepared in one [ at least ] field of white plastic film, and the black resin layer containing a black stain pigment may be prepared in the field which does not counter the light source further.

[0006] Hereafter, the lamp reflector of this invention is explained in detail. The field-like light equipment S shown in drawing 1 is equipped with a light guide plate 2, the tubular light source 1 arranged at the 1 side of a light guide plate 2, and the lamp reflector 3 with which the periphery of the tubular light source 1 was equipped. Such a lamp reflector 3 of field-like light equipment S is the layered product which formed the white resin layer 5 containing white pigments in one field of white plastic film 4, as shown in drawing 2 , and the tubular light source 1 is equipped with it, and it is used. When the tubular light source 1 is equipped, it may be equipped so that the 5th page of a white resin layer may be covered for the circumference of the tubular light source 1 as the inside, or you may equip so that the 4th page of white plastic film may be covered as the inside. Moreover, although illustration is not carried out, it may form the white resin layer 5 in both sides of white plastic film 4.

[0007] Moreover, as shown in drawing 3 , it is good as a lamp reflector 31 also as a layered product which carried out the laminating of the white resin layer 5 and the black resin layer 6 to white plastic film 4 one by one. moreover, although illustration is not carried out, the white resin layer 5 is formed in the whole surface of white plastic film 4, and on the other hand, the black resin layer 6 may be boiled, and may be prepared In any case, the tubular light source 1 is equipped and it is used so that the black resin layer 6 may become the opposite side of the tubular light source 1.

[0008] The white plastic film 4 of such lamp reflectors 3 and 31 has the operation as a substrate, and possesses flexibility, its white films, such as polyethylene, a polyethylene terephthalate, polypropylene, and a vinyl chloride, are desirable, and its foaming white polyester film is especially desirable from the point of a reflection factor. Moreover, the white resin layer 5 containing white pigments gives concealment nature, and reflects the light of the tubular light source 1. As a resin, synthetic resin, such as an urethane system, acrylic, an epoxy system, a vinyl system, a polyester system, a polyamide system, and a rubber system, can be used for the quality of the material of the white resin layer 5, and titanium oxide, a zinc oxide, a barium sulfate, a calcium carbonate, a magnesium carbonate, an aluminum hydroxide, a mica, talc, clay, etc. can be used for it as white pigments. These resins and a pigment may be used independently, and two or more kinds may be mixed and they may be used. In such a paint or ink, in order to improve dispersibility and application nature, additives, such as a dispersant and a leveling agent, can be added if needed.

[0009] Thus, in order to prepare the prepared paint or ink in white plastic film 4, the whole surface print processes by the applying methods, such as the bar coating method, the roll coating method, the spray coating method, and the DIP coating method, silk screen printing, offset printing, GURABIYA printing, etc. are usable, are uniformly formed by desired thickness, and have flexibility as a paint film.

[0010] The black resin layer 6 formed on the white resin layer 5 raises the concealment nature of the light of the tubular light source 1. As a resin which forms the black resin layer 6, synthetic resin, such as an urethane system, acrylic, an epoxy system, a vinyl system, a polyester system, a polyamide system, and a rubber system, can be used, and it is Spilon as a coloring agent. Black MH special (the Hodogaya chemistry industrial stock formula company make), Neozapon Black Black pigment, such as black colors, such as RE (BASF A.G. make), carbon black, and titanium black, is added. These resins and a stain pigment may be used independently, and two or more kinds may be mixed and they may be used. In such a paint or ink, in order to improve dispersibility and application nature, additives, such as a dispersant and a leveling agent, can be added if needed.

[0011] Thus, in order to form the black resin layer 6 using the prepared paint or ink, it forms by an application or printing uniformly on the white resin layer 5. As an application or the printing method, the whole surface print processes by the applying methods, such as the bar coating method, the roll coating method, the spray coating method, and the DIP coating method, silk screen printing, offset printing, GURABIYA printing, etc. can be used.

[0012] Flexibility and flexibility are required in order to equip the periphery of the tubular light source 1 with such lamp reflectors 3 and 31 of a layered product. About the flexibility in this case, and the flexible range, stress required to carry out circle die pressing and push in 10mm by the crowded method is desirable in 20g/inch or less. As circle die pressing is carried out and it is indicated in drawing 5 as the crowded method, the sample here adjusted with a width of face [ of 1 inch ] and a length [ of a periphery ] of 100mm in the shape of a cylinder is pushed in 10mm, and the method of measuring the stress at that time is said.

[0013] Generally, if it is the thing of the same thickness in order to raise the flexibility of a film, in order it is [ flexibility ] higher to be a multilayer and to raise flexibility further as a lamp reflector of this invention, you may make white plastic film 4 into two-layer structure here. In order to make white plastic film 4 two-layer, the homotypic of the above-mentioned white plastic film 4 or different species is laminated by binders, such as acrylic, a vinyl system, a rubber system, a silicon system, and a polyester system.

[0014] Moreover, as other examples, as shown in drawing 4, the lamp reflector 32 which really cast the white resin layer 7 to one field of white plastic film 41 is sufficient. Although the white resin layer 7 is formed in the outside of the tubular light source 1 drawing also in this case, you may prepare by carrying out the white resin layer 7 inside, and may prepare in both sides. Moreover, although illustration is not carried out, you may prepare a black resin layer in the outside of the white resin layer 7 of the lamp reflector 32.

[0015] What is necessary is just to cast the above-mentioned white plastic film and the resin which forms the above-mentioned white resin layer which scoured the above-mentioned white pigments in the two-layer structure of a configuration which fits in the tubular light source 1 by the well-known molding method, in order to really manufacture the lamp reflector 32 by molding.

[0016]

[Function] Since this invention consists of resins and a metallic conductor is not used for it as a lamp reflector of the light source of field-like light equipment, it can cancel poor lighting of the light source, moreover makes the concealment nature of the light from the light source increase, and can raise a reflection factor.

[0017]

[Example] The lamp reflector of a publication was produced in the examples 1-4.

The white plastic paint of composition below [an example 1] was applied to one side of foaming white polyester film (lumiler E-60 or 75-micrometer:Toray Industries, Inc. make) so that it might become the dry film thickness of 30 micrometers, and the lamp reflector 3 shown in drawing 2 was produced.

(White plastic paint composition) - A lacquer type urethane resin 20 weight sections (Bar knock 16-411:Dainippon Ink & Chemicals, Inc. make) - A titanium dioxide (TIPAQUE R-900:Du Pont make)

The 50 weight section and xylene The concealment nature of 30 weight sections lamp reflector 3, a reflection factor, and flexibility were measured by the following methods. Concealment nature is Machbeth. The transmittance factor density was measured with the TD-904 concentration-meter (product made from Machbeth) orthochromatic filter. The reflection factor measured the spectral reflectance with a wavelength of 550nm with UV-3101 spectrophotometer (Shimadzu Make). The above-mentioned carried out circle die pressing of the flexibility, and it was measured by the crowded method. A result is shown in Table 1.

[0018] Furthermore, it is the lamp reflector 3 4 cents and tubular surface brightness 30,000 cd/m<sup>2</sup> The lamp of the field-like light equipment which consists of the lamp of two LGTs, width of face of 240mm, a length of 165mm, a light guide plate with a thickness of 4mm, a reflecting plate of a foaming white film (E-60,188 micrometer \*\* of lumiler : Toray Industries, Inc. make), and a diffusion film of light rise 75PBA (Kimoto Make) was equipped. The average luminance of field-like light equipment was measured by luminance-meter CS-100 (Minolta Camera Co., Ltd. make). A result is shown in Table 1. On the white resin layer of the same lamp reflector 3 as the [example 2] example 1, the black paint of the following composition was applied so that it might become the dry film thickness of 2 micrometers, and the lamp reflector 31 shown in drawing 3 was produced.

(Black paint composition)

- An acrylic emulsion 25 weight sections (BONKOTO DV-759:Dainippon Ink & Chemicals, Inc. make)  
 - Carbon black (MA -100 : Mitsubishi Kasei Corp. make) 1 weight section and water It measured by the method of showing the concealment nature of 74 weight sections lamp reflector 31, a reflection factor, and flexibility in an example 1, and the same method. A result is shown in Table 1. Furthermore, the light source of the field-like light equipment which showed the lamp reflector 31 to the example 1, and the same field-like light equipment was equipped, and average luminance was measured similarly. A result is shown in Table 1.

It laminated by the binder of [example 3] foaming white polyester film (lumiler E-60 or 50-micrometer \*\*:Toray Industries, Inc. make) and the following composition of white polyester film (lumiler E-20 or 38-micrometer \*\*:Toray Industries, Inc. make), and the lamp reflector was produced.

(Binder composition)

- The acrylic binder (SK dyne AG105:Soken Chemical & Engineering, Inc. make) 97 weight section and curing agent (coronate L:Japan polyurethane industrial incorporated company make) It measured by the method of showing the concealment nature of 3 weight sections lamp reflector, a reflection factor, and flexibility in an example 1, and the same method. A result is shown in Table 1. Furthermore, the light source of the field-like light equipment which showed the lamp reflector to the example 1, and the same field-like light equipment was equipped, and average luminance was measured similarly. A result is shown in Table 1.

After laminating by the binder which showed a [example 4] white acrylic board (068 2mm \*\* of SUMIPEKKUSU : Sumitomo Chemical Co., Ltd. make), and foaming white polyester film (lumiler E-60 or 75-micrometer \*\*:Toray Industries, Inc. make) in the example 3, and the same binder, molding processing was carried out C type tubed with a bore of 5mm, and the lamp reflector 32 shown in drawing 4 was produced.

[0019] It measured by the method of showing the concealment nature of the lamp reflector 32, and a reflection factor in an example 1, and the same method. A result is shown in Table 1. Furthermore, the light source of the field-like light equipment which showed the lamp reflector 32 to the example 1, and the same field-like light equipment was equipped, and average luminance was measured similarly. A result is shown in Table 1.

Concealment nature, a reflection factor, and flexibility were measured by the same method as an example, using a silver vacuum evaporation film (GR38W:Kimoto Make) (example 1 of comparison), foaming white polyester film (E-60 75 micrometer \*\* of lumiler : Toray Industries, Inc. make) (example 2 of comparison), and foaming white polyester film (E-60 188 micrometer \*\* of lumiler : Toray Industries, Inc. make) (example 3 of comparison) as an example of [example of comparison] comparison. A result is shown in Table 1. Moreover, the lamp of the field-like light equipment shown in the example and the same field-like light equipment was equipped, and average luminance was measured similarly. A result is shown in Table 1.

[0020]

[Table 1]

|                                | 実 施 例 |      |      |      | 比 較 例 |      |                  |
|--------------------------------|-------|------|------|------|-------|------|------------------|
|                                | 1     | 2    | 3    | 4    | 1     | 2    | 3                |
| 隠蔽力<br>(オルソ濃度)                 | 1.20  | 4 以上 | 1.15 | 2.80 | 4 以上  | 0.86 | 1.20             |
| 反射率 %<br>(550 nm)              | 93.8  | 93.3 | 93.0 | 94.0 | 96.0  | 89.0 | 93.5             |
| 平均輝度<br>(cd/m <sup>2</sup> )   | 940   | 930  | 910  | 950  | 940   | 820  | -                |
| ランプ<br>点灯障害                    | 無し    | 無し   | 無し   | 無し   | 有り    | 無し   | 無し               |
| 取り付け<br>作業性                    | 良好    | 良好   | 良好   | 良好   | 良好    | 良好   | 巻き付<br>けでき<br>ない |
| 円型押し込み<br>法による柔軟<br>性 (g/inch) | 7     | 9    | 15   | -    | 1     | 4    | 120              |

[0021]

[Effect of the Invention] Since according to the lamp reflector by this invention it consists of resins and a metallic conductor is not used, can cancel poor lighting of the light source, moreover the concealment nature of the light from the light source is made to increase, and a reflection factor can be raised. Therefore, the light from the light source is reflected efficiently and the brightness of field-like light equipment can be raised very much. And it excels in flexibility and can carry out efficiently also in the case of wearing.

[Translation done.]